Table 2-2. Levels of Significant Exposure to Acetone – Inhalation

Figure key[a]	Species (strain) No./group	Exposure parameters	Doses (ppm)	Parameters monitored	Endpoint	NOAEL (ppm)	Less serious LOAEL (ppm)	Serious LOAEL (ppm)	Effects
ACUTE EXPOSURE									
Dick et al. 1989									
1	Human 11 M, 11 F	1 day 4 hours/day	237	CS	Neuro		237[b]		Increases in response times and 3–8% increase in false negatives compared to pre-exposure auditory discrimination test results; increased anger, hostility (POMS psychological test)
DiVincenzo et al. 1973									
2	Human 4 M	1 day 2 hours/day	100, 500	BC CS HE	Hemato	500			
					Hepatic	500			
					Renal	500			
Haggard et al. 1944									
3	Human NS M	1–8 hours	21,049, 42,097, 63,146, 84,194	CS	Neuro			21,049	Signs of narcosis in 3–6 hours, loss of righting reflex in 8 hours
Matsushita et al. 1969a									
4	Human 5 M	1 day 6 hours/day	0, 100, 250, 500, 1,000	CS UR HE	Resp		100		Irritation of nose, throat, trachea
					Hemato	250	500		Increased white blood cell count; decreased phagocytic activity of neutrophils
					Immuno	250	500		Increased white blood cell count; decreased phagocytic activity of neutrophils
					Neuro		250		Lack of energy, general weakness

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Figure key[a]	Species (strain) No./group	Exposure parameters	Doses (ppm)	Parameters monitored	Endpoint	NOAEL (ppm)	Less serious LOAEL (ppm)	Serious LOAEL (ppm)	Effects
Matsushita et al. 1969b									
5	Human 6 M	6 days 6 hours/day	0, 250, 500	CS HE	Resp		250		Irritation of nose and throat
					Hemato	250	500		Increased white blood cell count; decreased phagocytic activity of neutrophils
					Immuno	250	500		Increased white blood cell count; decreased phagocytic activity of neutrophils
					Neuro		250		Delayed visual reaction time, headache, lack of energy, weakness
Muttray et al. 2005									
6	Human 12	4.5 hours, 1 time	247		Neuro	247			
Nelson et al. 1943									
7	Human 10 B	1 day 3–5 minutes/day	NS		Resp	200	500		Nose and throat irritation
Raleigh and McGee 1972									
8	Human 4 M	2–3 days 8 hours/day	901	CS NX	Resp		901		Throat and nose irritation
					Neuro	901			
Raleigh and McGee 1972									
9	Human 9 M	7 days 8 hours/day	1,006	CS NX	Resp		1,006		Irritation of nose and throat
					Neuro		1,006		Headache, light-headedness
Ross 1973									
10	Human 8 M	1 day 2 minutes 4 hours/day	12,000	CS	Resp		12,000		Throat and lung irritation
					Neuro			12,000	Unconsciousness, dizziness, unsteadiness, confusion, headache

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Figure key[a]	Species (strain) No./group	Exposure parameters	Doses (ppm)	Parameters monitored	Endpoint	NOAEL (ppm)	Less serious LOAEL (ppm)	Serious LOAEL (ppm)	Effects
Seeber et al. 1992									
11	Human 16 NS	4–8 hours	0, 1,000	CS	Neuro		1,000		Subjective symptoms of tension, tiredness, complaints and annoyance, not otherwise specified
Stewart et al. 1975									
12	Human 4 F	1 day 7.5 hours/day	1,000	CS UR NX HE	Repro		1,000		Shortened menstrual cycle
Bruckner and Peterson 1981a									
13	Rat 5 M	1 day 3 hours/day	12,600, 19,000, 25,300, 50,600	CS	Death			50,600	5/5 died
					Neuro			12,600	CNS depression measured by unconditioned performance and reflex tests
Frantik et al. 1996									
14	Rat (Wistar) 4 M	4 hours	1,680, 4,210		Neuro		1,680		10% decrease in seizure inhibition
Goldberg et al. 1964									
15	Rat 8–10 F	2 weeks 5 days/week 4 hours/day	0, 3,000, 6,000, 12,000, 16,000	CS BW	Bd wt	16,000			
					Neuro	3,000		6,000	Inhibition of avoidance behavior in 38% of the rats
Haggard et al. 1944									
16	Rat NS	5 minutes–8 hours	2,105, 4,201, 10,524	CS	Neuro	4,210		10,524	Signs of narcosis, loss of coordination in 100–250 minutes
Lee et al. 2008									
17	Rat (Sprague-Dawley) 40	6 days 1 hour/day	5,000, 10,000, 20,000	CS	Neuro	20,000	5,000		Decreased locomotor activity

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Figure key[a]	Species (strain) No./group	Exposure parameters	Doses (ppm)	Parameters monitored	Endpoint	NOAEL (ppm)	Less serious LOAEL (ppm)	Serious LOAEL (ppm)	Effects
NTP 1988									
18	Rat 10–31 F	14 days 7 days/week 6 hours/day GDs 6–19	0, 440, 2,200, 11,000	BC BI RX DX	Bd wt	2,200			
					Repro	11,000			
					Develop	2,200	11,000		Decreased fetal weight (8%)
					Other noncancer		11,000		Significantly reduced body weight (7%), uterine weight (19%), and extra-gestational weight gain (36%) of dams
Pozzani et al. 1959									
19	Rat 6 F	4 or 8 hours	NS	LE	Death			21,091	SLOAEL: LC_{50} 8 hours SLOAEL: LC_{50} 4 hours
Smyth et al. 1962									
20	Rat 6 F	1 day 4 hours/day	16,000	CS	Death			16,000	1/6 died
De Ceaurriz et al. 1984									
21	Mouse 10 M	4 hours	0, 2,032, 2,580, 2,858, 3,021	BH	Neuro	2,032		2,580	39% decrease in duration of immobility in behavioral despair swimming (Porsolt force swimming) test ($p<0.05$)
Glowa and Dews 1987									
22	Mouse 12 M	1 day	100–56,000	CS	Neuro	1,000	3,000		10% decreased response to food presentation in a fixed interval operant behavioral test
Kane et al. 1980									
23	Mouse 4 M	1 day 10 minutes/day	800–150,000		Resp		77,516		RC_{50} for sensory irritation

Table 2-2. Levels of Significant Exposure to Acetone – Inhalation

Figure key[a]	Species (strain) No./group	Exposure parameters	Doses (ppm)	Parameters monitored	Endpoint	NOAEL (ppm)	Less serious LOAEL (ppm)	Serious LOAEL (ppm)	Effects
Mashbitz et al. 1936									
24	Mouse NS	4 hours	16,839, 25,258, 33,678, 42,097, 50,517, 55,989, 84,194	CS	Neuro			16,839	Drowsiness, staggering, prostration, clonic movements of hind legs, and deep narcosis
NTP 1988									
25	Mouse 10–33 F	1 day 6 hours/day	11,000	CS	Neuro			11,000	Severe narcosis
NTP 1988									
26	Mouse 10–33 F	12 days 7 days/week 6 hours/day GDs 6–17	0, 440, 2,200, 6,600	CS RX DX	Hepatic	2,200	6,600		Significantly increased absolute and relative liver weight of dams ($p<0.05$)
					Repro	6,600			
					Develop	2,200		6,600	Significantly increased incidence of late resorption, decreased fetal weight [8%], reduced sternebral ossification ($p\leq0.05$)
					Other noncancer	6,600			
Schaper and Brost 1991									
27	Mouse 4 M	1 or 5 days 0.5 hours/day	0, 6,000	HP CS	Resp	6,000			

Table 2-2. Levels of Significant Exposure to Acetone – Inhalation

Figure key[a]	Species (strain) No./group	Exposure parameters	Doses (ppm)	Parameters monitored	Endpoint	NOAEL (ppm)	Less serious LOAEL (ppm)	Serious LOAEL (ppm)	Effects
Specht et al. 1939									
28	Guinea pig 5 NR	2 days 24 hours/day	10,000	GN CS	Death			10,000	5/5 died
					Resp		10,000		Lung congestion in guinea pigs that died
					Hepatic		10,000		Fatty liver in guinea pigs that died
					Renal		10,000		Renal tubular distention
					Other noncancer		10,000		Congestion of spleen
Specht et al. 1939									
29	Guinea pig 10 F	1 day 25 minutes–-23.4 hours/day	21,800	GN CS	Death			21,800	2/10 died
					Neuro			21,800	Narcosis, coma, paralysis
Specht et al. 1939									
30	Guinea pig 9 NR	1 day 22–26 hours/day	20,000	GN CS	Death			20,000	8/9 died
					Resp			20,000	Marked congestion and hemorrhage of lungs
					Hepatic		20,000		Fatty liver in guinea pigs that died
					Renal		20,000		Distention of glomerular capsule
					Other noncancer		20,000		Marked congestion and hemorrhage of spleen
Specht et al. 1939									
31	Guinea pig 18 NR	1 day 3–8.75 hours/day	50,000	GN CS	Death			50,000	8/8 died at 3–4 hours exposure
					Resp			50,000	Pulmonary congestion and hemorrhage
					Hepatic		50,000		Mild fatty deposition
					Renal			50,000	Congestion and distention of glomeruli
					Other noncancer			50,000	Congestion and hemorrhage of spleen

Table 2-2. Levels of Significant Exposure to Acetone – Inhalation

Figure key[a]	Species (strain) No./group	Exposure parameters	Doses (ppm)	Parameters monitored	Endpoint	NOAEL (ppm)	Less serious LOAEL (ppm)	Serious LOAEL (ppm)	Effects
INTERMEDIATE EXPOSURE									
Stewart et al. 1975									
32	Human 10 M, 10 F	6 weeks 2–5 days/week 1–7.5 hours/day	0, 200, 1,000, 1,250	CS UR HE NX	Resp	1,250			
					Cardio	1,250			
					Hemato	1,250			
					Hepatic	1,250			
					Renal	1,250			
					Neuro		1,250		Increased visual evoked response
Bruckner and Peterson 1981b									
33	Rat 36 M	2–8 weeks 5 days/week 3 hours/day	0, 19,000	BW OW HP BC BI	Resp	19,000			
					Cardio	19,000			
					Hepatic	19,000			
					Renal	19,000			
					Neuro			19,000	Decreased brain weight relative to controls
Christoph et al. 2003									
34	Rat (Crl:CD BR) 10 M	13 weeks 5 days/week 6 hours/day	1,000, 2,000, 4,000		Neuro	4,000			

Table 2-2. Levels of Significant Exposure to Acetone – Inhalation

Figure key[a]	Species (strain) No./group	Exposure parameters	Doses (ppm)	Parameters monitored	Endpoint	NOAEL (ppm)	Less serious LOAEL (ppm)	Serious LOAEL (ppm)	Effects
CHRONIC EXPOSURE									
Ott et al. 1983a, 1983c									
35	Human 168 M, 77 F	3 months–23 years 5 days/week 8 hours/day (occupational)	380, 770, 1,070	CS HE	Hemato Hepatic	1,070 1,070			

[a]The number corresponds to entries in Figure 2-2.
[b]Used to derive an acute-duration oral minimal risk level (MRL) of 8 ppm. The LOAEL of 237 ppm was divided by an uncertainty factor of 30 (3 for use of a minimal LOAEL and 10 for human variability). Highlighted rows indicate an MRL principal study.

B = both male and females; BC = blood chemistry; Bd wt or BW = body weight; BI = biochemical changes; Cardio = cardiovascular; CNS = central nervous system; CS = clinical signs; Develop = developmental; DX = developmental toxicity; F = female(s); GD = gestation day; GN = gross necropsy; HE = hematology; Hemato = hematological; HP = histopathology; Immuno = immunological; LE = lethality; LOAEL = lowest-observed-adverse-effect level; LC_{50} = concentration producing 50% death; M = male(s); Neuro = neurological; NOAEL = no-observed-adverse-effect level; NR = not reported; NS = not specified; NX = neurological function; OW = organ weight; POMS = Profile of Mood States; RC_{50} = concentration of an airborne chemical that produces a 50% decrease in respiratory rate; Repro = reproductive; Resp = respiratory; SLOAEL = serious LOAEL; UR = urinalysis